

Amendments to and Listing of the Claims:

This listing of claims replaces all prior versions and listings of claims in this application.

1-46. (Canceled)

47. (Previously Presented) An apparatus for interleaving comprising:

- (a) a first blocker that groups a source sequence of symbols into a sequence of M blocks, wherein M is a number of the blocks and M is determined by the number of symbols of a source sequence, and wherein each block includes L number of symbols;
- (b) an intra-permuter that performs intra-block permutations on the sequence of M blocks to produce an intra-block permuted sequence by re-ordering the symbols within each block of the sequence of M blocks;
- (c) a second blocker that groups the intra-block permuted sequence into an intra-block permuted sequence of blocks; and
- (d) an inter-permuter that performs inter-block permutations on the intra-block permuted sequence of blocks by re-ordering the symbols in each block of the intra-block permuted sequence of blocks across a number of blocks to form an interleaved output sequence of symbols, wherein the symbols of a given block K in the intra-block permuted sequence of blocks are re-ordered across E_K blocks prior to the given block K and L_K blocks after the given block K , wherein E_K is an integer of $\min(D, K-1)$ and L_K is an integer of $\min(D, M-K)$, and D is a parameter associated with the inter-block permutation,

wherein the first blocker, the intra-permuter, the second blocker and the inter-permuter are operated overlapped in time.

48. (Previously Presented) The apparatus of claim 47 wherein the intra-permuter re-orders symbols within blocks of the sequence of symbols of a first length.

49. (Previously Presented) The apparatus of claim 47 wherein the inter-permuter re-orders symbols of blocks across their immediate neighboring $2D$ intra-block permuted sequence of symbols of a second length.

50. (Previously Presented) An apparatus for de-interleaving, the apparatus comprising:
- (a) a second blocker that groups a source sequence of symbols into a sequence of M blocks, wherein M is a number of the blocks and M is determined by the number of symbols of a source sequence, and wherein each block includes L number of symbols;
 - (b) an inter-permuter that performs inter-block de-permutations on the sequence of M blocks by re-ordering the symbols in each block of the sequence of M blocks across a number of blocks to form an interleaved output sequence of symbols, wherein the symbols of a given block K in the grouped sequence of blocks are re-ordered across E_K blocks prior to the given block K and L_K blocks after the given block K , wherein E_K is an integer of $\min(D, K-1)$ and L_K is an integer of $\min(D, M-K)$, and D is a parameter associated with the inter-block de-permutation;
 - (c) a first blocker that groups the inter-block permuted sequence into an inter-block permuted sequence of blocks;
 - (d) an intra-permuter that performs intra-block de-permutations on the inter-block permuted sequence of blocks to produce an intra-block permuted sequence by re-ordering the symbols within each block of the sequence of blocks;
 - (e) means for performing inter-block de-permutations on the sequence of M blocks to reverse inter-block permutations and produce a reverse inter-block permuted sequence; and
 - (f) means for performing intra-block de-permutations on the reverse inter-block permuted sequence to reverse intra-block permutations and produce a reverse intra-block permuted sequence,

wherein the first blocker, the intra-permuter, the second blocker and the inter-permuter are operated overlapped in time.

51. (Previously Presented) A method for interleaving comprising:
- (a) grouping a source sequence of symbols into a sequence of M blocks using a first blocker, wherein M is a number of the blocks and is determined by the number of symbols of a source sequence, and wherein each block includes L number of symbols;

- (b) performing intra-block permutations on the sequence of M blocks using an intra-permuter to produce an intra-block permuted sequence by re-ordering the symbols within each block of the sequence of M blocks;
- (c) grouping the intra-block permuted sequence into an intra-block permuted sequence of blocks using a second blocker; and
- (d) performing inter-block permutations on the intra-block permuted sequence of blocks using an inter-permuter by re-ordering the symbols in each block of the intra-block permuted sequence of blocks across a number of blocks to form an interleaved output sequence of symbols, wherein the symbols of a given block K in the intra-block permuted sequence of blocks are re-ordered across E_K blocks prior to the given block K and L_K blocks after the given block K, wherein E_K is an integer of $\min(D, K-1)$ and L_K is an integer of $\min(D, M-K)$, and D is a parameter associated with the inter-block permutation,

wherein the first blocker, the intra-permuter, the second blocker and the inter-permuter are operated overlapped in time.

52. (Previously Presented) The method of claim 51 wherein performing intra-block permutations re-orders symbols within blocks of the sequence of symbols of a first length.

53. (Previously Presented) The method of claim 51 wherein performing inter-block permutations re-orders symbols of the intra-block permuted block across their immediate neighboring 2D intra-block permuted sequence of symbols of a second length.

54. (Previously Presented) The method of claim 51 wherein the intra-block and inter-block permutations are performed simultaneously after being initiated.

55. (Previously Presented) A method for de-interleaving comprising:

- (a) grouping a source sequence of symbols into a sequence of M blocks using a second blocker, wherein M is a number of the blocks and is determined by the number of symbols of a source sequence, and wherein each block includes L number of symbols;

- (b) performing inter-block de-permutations on the sequence of M blocks using an inter-permuter by re-ordering the symbols in each block of the grouped sequence of M blocks across a number of blocks to form an interleaved output sequence of symbols, wherein the symbols of a given block K in the grouped sequence of M blocks are re-ordered across E_K blocks prior to the given block K and L_K blocks after the given block K , wherein E_K is an integer of $\min(D, K-1)$ and L_K is an integer of $\min(D, M-K)$, and D is a parameter associated with the inter-block permutation;
- (c) grouping the inter-block de-permuted sequence into an inter-block de-permuted sequence of blocks using a first blocker;
- (d) performing intra-block de-permutations on the inter-block permuted sequence of blocks using an intra-permuter to produce an intra-block de-permuted sequence by re-ordering the symbols within each block of the sequence of M blocks;
- (e) performing inter-block de-permutations on the sequence of M blocks to reverse inter-block permutations; and
- (f) performing intra-block de-permutations on the reverse inter-block permuted sequence to reverse intra-block permutations

wherein the first blocker, the intra-permuter, the second blocker and inter-permuter are operated overlapped in time.

56. (Currently Amended) The method of claim 43 55 wherein steps (e) and (f) further comprise performing permutations to reverse intra-block and inter-block permutations simultaneously.

57. (Previously Presented) The apparatus of claim 47 wherein the interleaved output sequence of symbols is at least partly outputted before the entire source sequence of symbols is inputted into the first blocker.

58. (Previously Presented) The method of claim 51 wherein the interleaved output sequence of symbols is at least partly outputted before the entire source sequence of symbols is inputted into the first blocker.